Wetlands Function Assessment Project *Update*

A periodic bulletin on a Washington State effort to develop methods for assessing the performance of wetland functions

Washington State's Wetland Function Assessment Project has completed its first drafts of methods containing numeric "models" for assessing the functions of Depressional and Riverine wetlands in the lowlands of western Washington. These drafts are now being revised and calibrated using data collected in the field. The project is also launching an effort in eastern Washington to develop function assessment methods for Depressional wetlands in the Columbia Basin.

As described in Update No. 2 *(Ecology Pub. #96-126)*, Washington is using many components of the national Hydrogeomorphic (HGM) approach in developing our models. In this approach, methods are developed for different types of wetland based on characteristics such as source of water, and direction of water movement within the wetland ("hydro-") and topographic position in the landscape ("-geomorphic").

Under this classification system, the major types or classes of wetlands are riverine, depresssional, slope, flats, coastal fringe, and lake fringe. Classes are further divided into subclasses for various geographic areas in the state.

For example, Depressional wetlands in western Washington lowlands are at present divided into "flowthrough" (those that have surface water outlets) or "closed" (those without surface water outlets). Figure 1 shows examples of the different water regimes of these two wetland subclasses.

Wetlands within a subclass are expected to perform similar functions in similar ways. The task of the Wetland Function Assessment Project is to develop assessment methods tailored to each of the subclasses, starting with the western Washington Depressional and Riverine classes.

Indicators key to rapid assessment

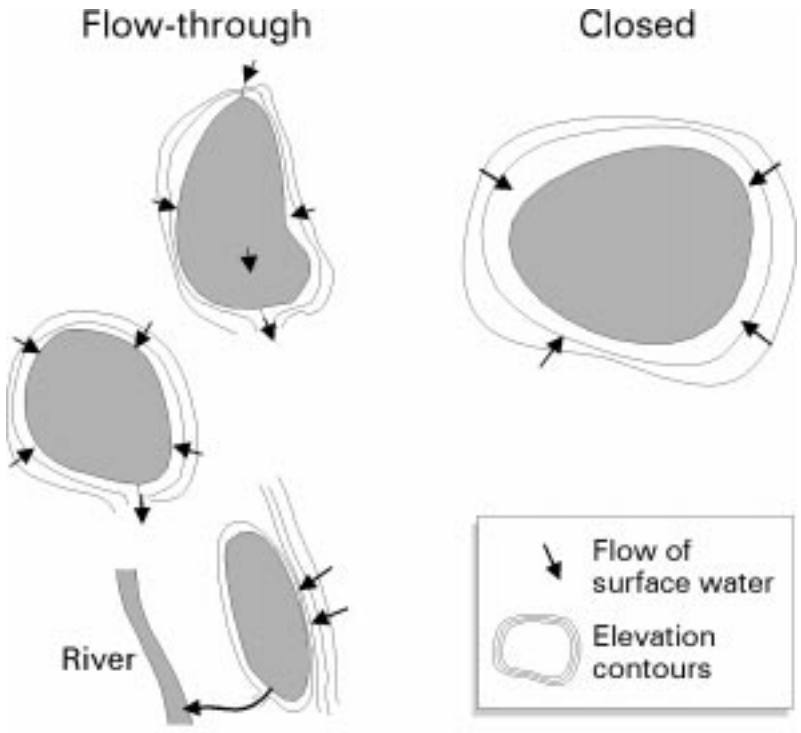
In many situations, wetland experts must be able to assess a wetland's functions relatively quickly. The assessment methods they use, however, must also be scientifically acceptable and provide enough information to make management decisions. To accomplish this, the methods rely on **indicators** instead of measuring functions directly through intensive scientific monitoring.

Indicators are environmental characteristics in and around wetlands that are strongly correlated to specific functions. The number of indicators used to assess a particular function can range from few to many.

For example, one of eight indicators that may be used to assess the richness of aquatic bird habitat in Depressional Flowthrough wetlands is standing dead trees, or snags. The extent to which snags are used for nesting is related to their decomposition and diameter.

This indicator, therefore, could be expressed by counting the decomposition stages of snags of a minimum diameter in the wetland. By contrast, a direct measure of the richness of habitat for aquatic birds would be the actual number of aquatic birds using snags during breeding season.

Figure 1. Examples of HGM classification for depressional wetlands in lowlands of western Washington



Indicators basis of "models"

Multidisciplinary teams of experts (Assessment Teams) identify indicators and use them to develop mathematical formulas (known as **models**) to determine the level of performance of particular functions. A set of these models, one for each function, will be included in the methods for assessing the functions of a specific wetland subclass. The methods will also include guidance on collecting data on the indicators.

The Assessment Teams use data collected in the field at "reference" wetlands to assign a number from 0 – 1 (with 1 being the highest) to each indicator. The assigned number will depend on the degree to which the indicator is present in the wetland being assessed *(see the example below)*. Assigning a number to indicators is called **scaling**. This process is called **calibration**.

A hypothetical example

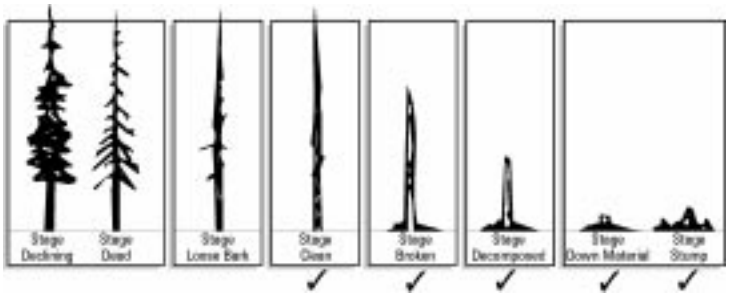
Figure 2 is a hypothetical example using snags to show how field data about indicators are translated into numeric function assessment models.

In this example, a wetland could have between 0 – 8 types of decomposition stages present (Figure 2, line A). Using a hypothetical example of scaling, 0-2 stages present would receive a score of 0.3, 3-4 a score of 0.5, 5-6 a score of 0.8, and 7-8 a score of 1.0 (line B).

Let's say the wetland area being assessed has five stages of snags. It would receive a score of 0.8 for that indicator. The 0.8 would then be plugged into the model, along with the scores for

Figure 2. A hypothetical model for assessing the richness of aquatic bird habitat for *Depressional Flowthrough* wetlands

A. Example of One Possible Indicator – Snags



= **5**

B. Hypothetical Scaling for Snags

0-2 stages = 0.3
3-4 stages = 0.5
5-6 stages = 0.8
7-8 stages = 1.0.

C. Hypothetical Model

(Interspersion of vegetation classes + Special habitat features + **Snags** + Open water + Edge structure + Score from invertebrate model[1] + Score from amphibian model[1] + Score from fish model[1])

Divided by

(Average score in the reference standard wetlands)

D. Hypothetical Assessment

Indicator scores plugged into formula, scaled 0-1 (with 1 being highest)

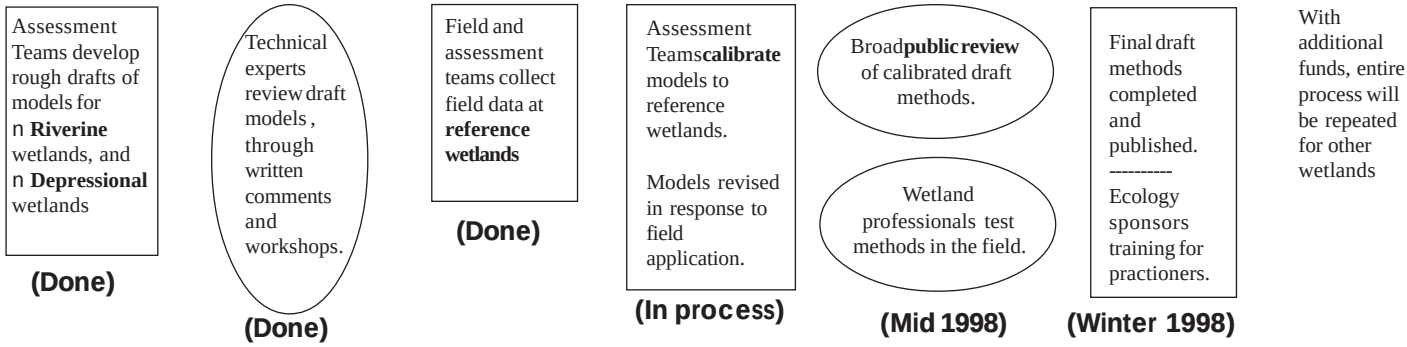
$$\frac{0.5 + 0.3 + \mathbf{0.8} + 0.5 + 0.8 + 0.5 + 0.5 + 0.3}{6.4} = \frac{4.2}{6.4} =$$

Index of Performance, scaled 0-1 (with 1 being highest)

0.65

[1] *Note: Scores from other models are used to indicate the presence of potential food for aquatic birds.*

Figure 3. Schedule for developing function assessment methods for Western Washington



Developing function assessment methods that are scientifically acceptable requires extensive technical review. Ecology's approach is based on Assessment Teams of technical experts developing draft products, followed by public and technical review.

the other indicators. (Line C shows a hypothetical model, line D shows how the model would be used in an assessment.)

The result is a numeric score from 0-1 for that function, with one being the highest score. The numeric score is called an **index of performance**. A wetland would get an index for each function, not an overall score.

Reference wetlands

The Assessment Team scales the indicators for each function equation based on data collected at **reference wetlands**. The reference wetlands are a set of wetlands that encompass the known variations in performance of functions within a subclass. They include those that perform the various functions at a low level, as well as the highest performing wetlands for each function. The highest performers would receive a score of 1 for that function.

For the methods developed for Washington, those that perform at the highest level, regardless of their level of alteration, are called **reference standard wetlands.** A different set of wetlands may provide the reference standards for each function performed by that particular subclass.

4 subclass models drafted

The Wetland Function Assessment Project is currently focusing on developing methods for subclasses of Riverine and Depressional wetlands in the lowland areas west of the Cascades. The subclasses include *Riverine Flowthrough* and *Riverine Impounding* wetlands, and *Depressional Flowthrough* and *Depressional Closed* wetlands. The general timeline for developing methods is summarized in Figure 3.

Project leaders recruited regional experts for two interdisciplinary Assessment Teams to draft the models, one for Riverine and one for Depressional wetland subclasses. The teams completed their first drafts of models in the spring of 1997.

Function models for all subclasses were included in one document for review. National and regional experts from the following disciplines reviewed the document: hydrology, water quality, soils, fish, wildlife, amphibians, and invertebrates. These experts helped revise the models at an interactive workshop in March 1997.

Calibration data collected

Field teams and the Assessment Teams gathered information on indicators from 86 reference wetlands, representing all four subclasses, from sites throughout western Washington. Early in December, the Assessment Teams met to review the data, revise the models, and scale each indicator.

After reviewing the field data, the Assessment Teams are considering combining the Riverine Impounding and Depressional Flowthrough subclasses because their characteristics are very similar. Decisions about combining these subclasses will be made in February 1998.

Project staff will now begin to write the methods containing a set of these mathematical models, one for each function for each subclass, along with guidance on how to collect the data.

The method documents containing draft calibrated models should be ready for review and testing in late spring of 1998. Look for an Update in the Spring announcing details regarding a plan to review and test the methods. The test will be designed to determine reproducibility, understandability, ease of use, and time efficiency of the methods.

Kicking off E. WA effort

This summer the Wetland Function Assessment Project began work in eastern Washington. An Assessment Team was recruited and, in September 1997, began work on methods for Depressional wetlands in the Columbia Basin.

The Assessment Team is currently identifying the subclasses and functions for which models will be developed. They will produce the first drafts of models in late Spring 1998, followed by selected technical review from specific disciplines. The Columbia Basin effort will follow the same steps used to develop the western Washington methods.

For more information

For more information, see Ecology's home page at www.wa.gov/ecology/ under the "Shorelands & Wetlands" section.

If you have specific questions, or would like to get involved, contact Teri Granger, Washington Department of Ecology, P.O. Box 47600, Olympia Washington 98504-7600, (360) 407-6547, e-mail tgra461@ecy.wa.gov

Wetlands Function Assessment Project

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This newsletter reports on the progress of Washington State's ***Wetland Function Assessment Project****.*

The project is a statewide effort to develop relatively rapid, scientifically acceptable methods of assessing how well wetlands perform functions such as improving water quality, reducing floods, and providing wildlife habitat.

The methods will be developed for different wetland types in Washington State.

The project fills a need for function assessment methods that numerically describe how well a function is performed and that are specifically designed for the wetlands types of the Pacific Northwest.

The project is funded by the Environmental Protection Agency and coordinated by the Washington Department of Ecology.

Public involvement and technical peer review of methods is critical to the success of this project. This update is published periodically to keep interested parties informed of our progress. Please share this update with others that may be interested.

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